In the Claims

1. (currently amended) A method for detecting symbols of a modulated signal received via channels of a wireless communications system, comprising:

obtaining an initial estimate of a symbol transmitted via the channels from a previous channel estimate and a received symbol;

updating the channel estimate;

optimizing ~~the~~ a next estimate of the transmitted symbol which maximizes an expectation of a log likelihood function by averaging a logarithm of a likelihood function over unknown parameters h of the channels;

quantizing the next estimate of the transmitted symbol;

comparing the quantized next estimate of the transmitted symbol with the ~~previous~~ initial estimate of the transmitted symbol to determine if the ~~previous~~ initial estimate of the transmitted symbol and the quantized next estimate of the transmitted symbol have converged; and otherwise

inputting the quantized next estimate of the transmitted symbol as the initial estimate of the transmitted symbol; and

repeating the updating, the optimizing, the quantizing, and the comparing until the ~~previous~~ initial estimate of the transmitted symbol and the quantized next estimate of the transmitted symbol converge.

2. (currently amended) The method of claim 1 wherein the modulated signal is a MPSK modulated signal having a positive constant equivalent to an energy of the modulated signal, and using only phase information during the updating.

3. (currently amended) The method of claim 1 wherein the comparing further comprises:

subtracting the ~~previous~~ initial estimate of the transmitted symbol from the quantized next estimate of the transmitted symbol to obtain a difference; and

determining that the ~~previous~~ initial estimate and the quantized next estimate have converged when an absolute value of the difference is less than a predetermined threshold.

4. (currently amended) The method of claim 1 further comprising:

obtaining the initial estimate of the transmitted symbol from the channel estimate of a pilot symbol received via the channels.

5. (currently amended) The method of claim 1 further comprising:

obtaining the initial estimate of the transmitted symbol from the channel estimate of a previously received symbol.

6. (currently amended) The method of claim 1 wherein the optimizing further comprises:

using only a fast Fourier transform matrix, the received ~~signal~~ symbol, and the previous channel estimate .

7. (currently amended) The method of claim 1 wherein the next estimate of the transmitted symbol is quantized according to ~~the signal constellation~~ a constellation of the received signal.

8. (currently amended) The method of claim 1 further comprising:

determining a posterior covariance matrix $\cancel{\Sigma_p}$ $\underline{\hat{\Sigma}_p}$ of the channels using a FFT matrix $\mathbf{W}$, the ~~previous~~ initial estimate of the transmitted symbol $\mathbf{X}_p$, the received symbol $\mathbf{Y}$, and a Gaussian noise variance σ^2 as

$$\hat{\Sigma}_p = (\mathbf{W}^H \mathbf{X}_p^H \mathbf{X}_p \mathbf{W} / \sigma^2)^{-1},$$

determining a posterior mean $\underline{\hat{h}}_p$ of a channel impulse response as

$$\underline{\hat{h}}_p = \hat{\Sigma}_p (\mathbf{W}^H \mathbf{X}_p^H \mathbf{Y} / \sigma^2);$$

determining a channel update coefficients matrix $\mathbf{C}$ for recovering the next estimate of the transmitted symbol; and

applying the coefficient matrix $\mathbf{C}$ to the posterior mean $\underline{\hat{h}}_p$, the FFT matrix $\mathbf{W}$, and the received ~~signal~~ symbol $\mathbf{Y}$ according to

$\underline{\tilde{X}}_{p+1} = \mathbf{C}^{-1}(\underline{\hat{h}}_p^H \mathbf{W}^H \mathbf{Y})^T$ to optimize the next estimate of the transmitted symbol $\cancel{\mathbf{X}_{p+1}}$ $\underline{\underline{\tilde{X}}_{p+1}}$.

9. (currently amended) The method of claim 1 further comprising:

determining a posterior covariance matrix $\cancel{\Sigma_p}$ $\underline{\hat{\Sigma}_p}$ of the channels using a FFT matrix $\mathbf{W}$, the previous estimate of the transmitted symbol $\mathbf{X}_p$, a channel convergence matrix Σ^{-1}, and a Gaussian noise variance σ^2 as

$$\hat{\Sigma}_p = (\mathbf{W}^H \mathbf{X}_p^H \mathbf{X}_p \mathbf{W} / \sigma^2 + \mathbf{\Sigma}^{-1})^{-1};$$

determining a posterior mean $\underline{\hat{h}}_p$ of a channel impulse response as $\underline{\hat{h}}_p = \hat{\mathbf{\Sigma}}_p(\mathbf{W}^H \mathbf{X}_p^H \mathbf{Y}/\sigma^2 + \mathbf{\Sigma}^{-1} E\{\underline{h}\})$, where the received symbol is **Y**, and $E\{\underline{h}\}$ is a channel impulse response;

determining a channel update coefficients matrix **C** for recovering the next estimate of the transmitted symbol; and

applying the coefficient matrix **C** to the posterior mean $\underline{\hat{h}}_p$, the FFT matrix **W,** and the received ~~signal~~ symbol **Y** according to $\underline{\tilde{X}}_{p+1} = \mathbf{C}^{-1}(\underline{\hat{h}}_p^H \mathbf{W}^H \mathbf{Y})^T$ to optimize the next estimate of the transmitted symbol $\cancel{\mathbf{X}_{p+1}}$ $\underline{\underline{\tilde{X}}_{p+1}}$.

10. (cancelled)

11. (original) The method of claim 1 further comprising:

modulating the signal using orthogonal frequency division multiplexing.

12. (currently amended) A system for detecting symbols of a modulated signal received via a plurality of channel of a wireless communications system, comprising:

means for obtaining an initial estimate of a symbol transmitted via the channels;

means for updating the channel estimate;

means for optimizing a next estimate of the transmitted symbol which maximizes an expectation of a log likelihood function by averaging a logarithm of a likelihood function over unknown parameters $\underline{h}$ of the

channels;

means for quantizing the next estimate of the transmitted symbol;

means for comparing the quantized next estimate of the transmitted symbol with the previous estimate of the transmitted symbol to determine if the ~~previous~~ initial estimate and the quantized next estimate have converged; and otherwise

means for making the quantized next estimate of the transmitted symbol an input for a next iteration; and

means for repeating the updating, the optimizing, the quantizing, and comparing until the ~~previous~~ initial estimate of the transmitted symbol and the quantized next estimate of the transmitted symbol converge.

13. (currently amended) The system of claim 12 wherein the modulated signal is a ~~MPSK~~ multiple phase shift keying modulated signal having a positive constant equivalent to an energy of the modulated signal, and using only phase information during the updating.

14. (currently amended) The system of claim 12 further comprising:

means for subtracting the ~~previous~~ initial estimate of the transmitted symbol from the quantized next estimate of the transmitted symbol to obtain a difference; and

means for determining that the ~~previous~~ initial estimate and the next estimate have converged when an absolute value of the difference is less than a predetermined threshold.

15. (currently amended) The system of claim 12 wherein the initial estimate of the transmitted symbol is obtained from a pilot symbol received via the channels.

16. (currently amended) The system of claim 12 wherein the initial estimate of the transmitted symbol is obtained from a channel estimate from ~~the previous~~ a previously received symbol.

17. (currently amended) The system of claim 12 further comprising:

means for determining a posterior covariance matrix $\cancel{\Sigma_p}$ $\hat{\Sigma}_p$ of the channels using a FFT matrix **W**, the initial estimate of the ~~previous~~ transmitted symbol $\mathbf{X}_p$, the received symbol **Y**, and a Gaussian noise variance σ^2 as $\hat{\Sigma}_p = (\mathbf{W}^H \mathbf{X}_p^H \mathbf{X}_p \mathbf{W}/\sigma^2)^{-1}$,

means for determining a posterior mean $\hat{h}_p$ of the channel impulse response as $\hat{h}_p = \hat{\Sigma}_p(\mathbf{W}^H \mathbf{X}_p^H \mathbf{Y}/\sigma^2)$;

means for determining a channel update coefficients matrix **C** for recovering the next estimate of the ~~next~~ transmitted symbol; and

means for applying the coefficient matrix **C** to the posterior mean $\hat{h}_p$, the FFT matrix **W**, and the received ~~signal~~ symbol **Y** according to $\tilde{X}_{p+1} = \mathbf{C}^{-1}(\hat{h}_p^H \mathbf{W}^H \mathbf{Y})^T$ to maximize the next estimate of the ~~next~~ symbol $\cancel{\mathbf{X}_{p+1}}$ $\tilde{X}_{p+1}$.

18. (currently amended) The system of claim 12 further comprising:

means for determining a posterior covariance matrix Σ_p $\hat{\Sigma}_p$ of the channels using the FFT matrix $\mathbf{W}$, the initial estimate of the ~~previous~~ transmitted symbol $\mathbf{X}_p$, a ~~channels~~ channel convergence matrix Σ^{-1}, and a Gaussian noise variance σ^2 as $\hat{\mathbf{\Sigma}}_p = (\mathbf{W}^H \mathbf{X}_p^H \mathbf{X}_p \mathbf{W}/\sigma^2 + \mathbf{\Sigma}^{-1})^{-1}$;

means for determining a posterior mean $\hat{\underline{h}}_p$ of ~~the channels~~ a channel impulse response as $\hat{\underline{h}}_p = \hat{\mathbf{\Sigma}}_p(\mathbf{W}^H \mathbf{X}_p^H \mathbf{Y}/\sigma^2 + \mathbf{\Sigma}^{-1} E\{\underline{h}\})$, where the received symbol is $\mathbf{Y}$ and $E\{\underline{h}\}$ is a channel impulse response;

means for determining a channel update coefficients matrix $\mathbf{C}$ for recovering the estimate of the next transmitted symbol; and

means for applying the coefficient matrix $\mathbf{C}$ to the posterior mean $\hat{\underline{h}}_p$, the FFT matrix $\mathbf{W}$, and the received ~~signal~~ symbol $\mathbf{Y}$ according to $\tilde{\underline{X}}_{p+1} = \mathbf{C}^{-1}(\hat{\underline{h}}_p^H \mathbf{W}^H \mathbf{Y})^T$ to maximize the next estimate of the ~~next~~ symbol ~~$\mathbf{X}_{p+1}$~~ $\tilde{\underline{X}}_{p+1}$.

19. (cancelled)

20. (original) The system of claim 12 wherein the signal is modulated using orthogonal frequency division multiplexing.